Release 1.0

89-3 14 March 1989

FORUM DOCUMENTATION: LAYERS, LAYERS EVERYWHERE

Once a year Release 1.0 focuses on the world at large to set the stage for the PC Forum. (The names of companies, people and products featured at the Forum are in boldface and are listed in the index on page 30. A separate program lists others attending who are not so identified, and shows events and times.) We have tried to put everything in context, but we know we could say it all better and smarter with the Forum behind us. That is why this newsletter is called Release 1.0, and why it's worth holding the Forum. Herewith, our best wisdom as of 14 March 1989...

Every year looks confused at the time and clear in hindsight. This year the pc companies and the workstation companies are waging war, but it's like the U.S. battle with the Japanese: They are us. If they're over here hiring our people and buying our products to run plants to build things to sell to us, how can we object? If everyone is fighting for the same desktops -- traditional pc companies, Sun, Solbourne, DEC and even IBM (with its refurbished RT RISC machine, no longer the RT *PC*) -- who's the intruder? In the end, vendors are fighting competitors, whatever their affiliation.

The year of the layers

The hardware vendors' ammunition is software, both to enhance their machines' particular usefulness and to make that value accessible directly to users and to other systems. As platforms proliferate, so do their incompatible components, arrayed in layers. In a multi-vendor world, customers are pleading for connectivity, interoperability and tools for communication among the layers. We're talking about both vertical and horizontal layers (both systems software and applications and data formats) -- so that, for example, a UNIX application run on a variety of boxes with either Open Look or (a tailored version of) Microsoft's Presentation Manager, or 1-2-3 can share data with and send commands to a UNIX CAD package. ⟹

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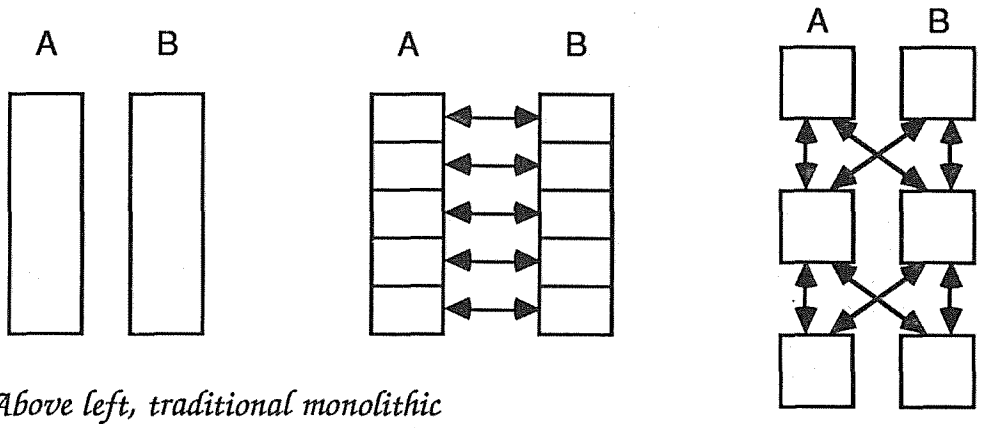
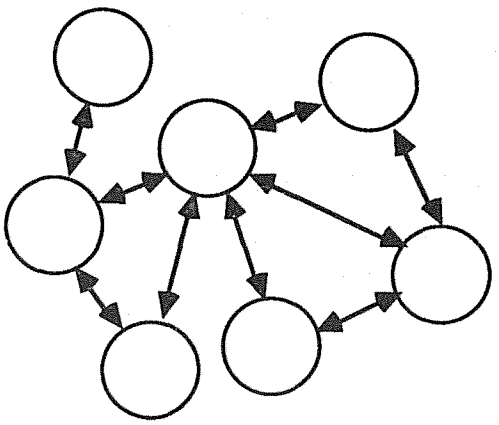
The purpose of layers is to stratify a system into components separated by standard interfaces that will insulate each component from the others, and allow potentially incompatible components to work together smoothly. Applications should be able to communicate logically at a high level, without regard to the plumbing underneath. Interfaces between layers include programming interfaces (APIs), network interfaces, database languages such as SQL and many other burgeoning standards. Of course, the proliferation of interfaces merely shifts the burden of interoperability: Which interfaces do *you* support?

From layers to objects



Above left, traditional monolithic architecture. Above middle, layered architecture. Above right, layered architecture with interoperable layers. Across, right, object-oriented (distributed) architecture with full modularization of components. A and B are no longer distinct. The components (layers) include hardware, network plumbing, operating systems, databases, user interfaces, et cetera.



As shown above, layers serve to allow systems to work together. The two monolithic systems (A and B) on the left can't communicate, whereas the two in the middle need special protocols at each level. At the upper right, a distributed architecture, A and B are composed of modular layers that can easily switch with each other, and communication between the two systems is easy. At the lower right, in an object-oriented architecture, any module can talk to any other module, and A and B lose their form as discrete systems and turn into collections of objects and functions anyone (or any program) can call. *(WARNING: Do not try this experiment at home!)*

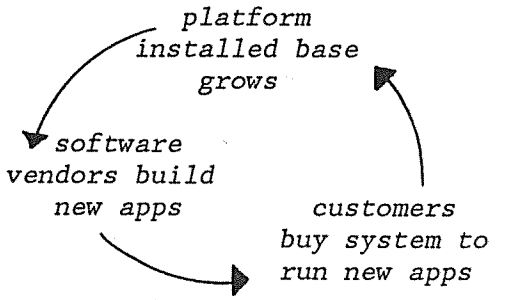
While the open systems movement, centered around UNIX, proclaims the benefits of freedom and total interoperability, the truth is far from that. One company president we know says, "I give speeches about the importance of interoperability all the time, and customers believe me, but my engineers still don't understand and don't deliver what I promise." Yes, the products work together, but only if you've got source code, linker and loader handy.

The technological imperative to interoperability and its imperfect realization are fostering a business movement towards combinations, whether strategic alliances or tangible, outright acquisitions. The best result in fruitful collaboration (Living Videotext and Breakthrough by **Symantec**, TOPS by **Sun**, Ansa by **Borland**); the worst in disappointment or absorption of the lesser partner (Think by Symantec, MultiMate by **Ashton-Tate**, Orion by **Apple**, Smart by Informix).

Customers like the choice the open systems movement gives them, but they don't want to spend all their time hooking things together; they want the parts they buy pre-assembled by a full-service vendor. That's why 3Com has teamed up with **Hewlett-Packard**,[1] and why Santa Cruz Operation pulled together a set of software components to provide **Open Desktop**, the first conveniently packaged all-in-one UNIX environment to run on standard 386 pcs. Such alliances are also cropping up between resellers and vendors, who demand firmer, more exclusive relationships with resellers. Compaq's repudiation of Businessland is a counterexample that proves the trend; Compaq's stated desire not to favor any one reseller sounds fair and reasonable, but it makes sense only for commodity products. On the other side, many resellers are paring their product lines to provide stronger, more in-depth support for a limited range of brands.

THE MACHINES

While vendors wage war over operating systems, customers buy hardware and applications, letting their vendors figure out the systems software questions. Everything is influenced by something else, but hardware is as good a place to start as any.



Vendor: "Where do I get on?"

Workstations vs. pcs

There's a misperception that workstations are distinguished from pcs by their technology. Workstations are always connected, whereas networking is optional with pcs. In fact, they may well run the very same processors, but until now, they have always been distinguished by market and distribution channels. This means that pc vendors will have an advantage as the two worlds collide in the retail channel, but the high-end vendors will take the advantage back as connectivity and support gain importance in a systems world. Anyone can go out and buy workstation technology; that's what's inside the Mac II.

1*This alliance is likely to be sturdier than most, because of strong personal relationships between the companies. 3Com ceo Bill Krause, for example, grew up at HP before joining 3Com.*

In the years ahead, the distinction will become cultural only. Can **Sun** sell in the mass market? Can Apple handle high-end business and technical needs? Can UNIX attract the personal applications that people want on their desktops (to the extent that many engineers keep a Mac or pc next to their workstations)? Few analysts, clerks or executives keep a workstation next to their pcs. In short, the market keeps moving up as long as its basic needs (personal productivity, in this case) are satisfied. So if the workstation vendors can add pc functionality to their workstations -- a la SunWrite, -Paint and -Draw (but where's SunCalc?) -- they have a chance.

What lures application builders, of course, is a large installed base. In the end, we're more likely to see personal tools move to workstations than workstation software starting out on pcs. Horizontal marketers with successful products have the resources and the incentive to move to workstations for incremental growth. The reverse is not necessarily true; successful marketers of niche-market packages are more likely to enter a new niche while remaining on a high-end platform where they can charge a lot for their software. Vendors of valuable tools that address an inherently small vertical market know that the value of their product matters more than the machine it's on (as long as it's not *too* weird). New products are driven by functionality; old ones by price. (Some "niche" markets are in fact fairly broad, as AutoDesk has proved -- and as **Aldus** has taught Interleaf.)

Servers

The platform, in the end, is neither DOS nor UNIX nor OS/2 machines, but all of these along with networks and servers. Applications will be written not for individual machines but for collections of them, and must be configurable. Ideally, they will be configurable for combinations of environments, as with **Novell's Portable NetWare** or other cross-OS server software, as well as collections of machines and people. (One significant value of groupware tools, as of the next generation of databases, will be their ability to shield builders of groupware applications from all the layers beneath the tools. Many groupware tools will themselves be built around databases, thereby delegating the insulation task.)

Client/server architecture is gaining ground. It's the easiest way to share resources and data, and to match machines to tasks. Client/server architectures offer maximum flexibility in allocation of resources, at least until we have genuine distributed processing (where any unit can operate as client or server). Distributed database is a subset of cooperative processing, where a developer needn't know about distribution of processing as long as he relies on the database to handle it.

The corresponding server hardware can be pcs or workstations, but they are not ideal. Minicomputers or the new generation of servers are better suited to the task. The big question is: Do you need a server? Or only a server policy? That is, can companies such as Apple and Compaq get by with offers of connectivity to servers from other vendors? 3Com's alliance with HP is meant to answer that question, by providing customers with a sanctioned upgrade path as well as support from a direct-sale channel. We expect many of the lower-end companies to form alliances with NetFrame -- but that still begs the question of mainframe connectivity. **NetFrame** may well be the ideal server for future data and software -- but existing data and software are sitting on mainframes.

Servers are likely to be the major source of OS/2 sales for the immediate future -- a situation that augurs poorly for **IBM**'s single-user **Extended Edition**, which implicitly assumes that each user wants the full complement of connectivity and database tools at his desk. That's rarely the case: Users merely want access through front-ends to those capabilities on a server. Until something compelling shows up, most users will keep using DOS locally, and leave the powerful stuff to a server -- either UNIX or OS/2. Although the number of units may be smaller, server applications offer greater value than corresponding standalone applications, even if the difference is only in the pricing. (See the case of **Lotus**, page 22.)

Application binary interfaces depend on hardware

Simply choosing an operating system doesn't give you the shrink-wrap compatibility that users want. (We'll know it's arrived when we start getting demo copies of shrink-wrapped UNIX software in the same profusion as demos of pc and Macintosh programs.) Apart from the user interface, which can be delivered along with an application in runtime form, an application also depends on a particular processor underneath all the software layers. The actual logic of the application is executed by a compiled language which runs a particular instruction set -- on the 386, say, or the SPARC, MIPS, 88000, 68000 or Intel 860. It calls to UNIX or OS/2 to manage the hardware environment, and maybe to a database to manage the data, but it relies *directly* on the microprocessor to do its "thinking." Users aren't willing to recompile; they want software right out of the box.

All the measures that make portability "easy" -- use of standard languages, use of interface toolkits that can switch from one look to another at the click of a mouse -- are of little utility at the end, when the user wants to select a package from a shelf and run it -- without recompilation, extensive configuration or other work. Hunter Systems' XDOS (see **Release 1.0**, 88-11), for example, will be used by software vendors to broaden their range of target machines or by resellers to deliver configured software for users, but it's unlikely to be used by many end-users themselves.) **Phoenix Technologies** continues to provides the means for hardware vendors to build clones and exploit the clonee's software base without specific support from the software vendors. The presence of clones -- as Sun understands -- also enhances the appeal of the very machines they compete with. IBM also knows this, but doesn't seem to believe it in its heart of hearts, while Apple fervently believes the opposite -- and has been right so far.

CASE STUDY: APPLE LACKS LAYERS, GETS MODULARITY

Ease of use isn't everything. Can Apple bypass layers and pass straight through to a distributed architecture? There's a solution for database, but not yet for distributed processing in general.

A recent New York Times article on the pc-workstation wars quoted **Apple**'s Allen Loren saying that Sun's friendliness (Open Look) is only "bolted on." That's true, but that's what it *should* be in a world of layers. The Mac's all-in-one architecture makes it difficult to program for and difficult to port to and from -- a disadvantage in a world where other vendors now offer GUIs too. True, Apple showed the way (fanning on a dim flame sparked by Xerox), but the path to user-friendliness is now clear for everyone. It's a lot easier -- as Apple is discovering -- to bolt on a user interface than to replace a single-tasking foundation with a multi-tasking one.

Apple also lacks an industrial-strength database server (or any server at all; using a beautiful Mac II as a server is a waste). But perhaps there's no need for one if we can move to distributed architectures fast enough, with every system both a client and a server. Someone is now proposing this solution, to the database part anyway, with a distributed database. That vendor is Business Software International of Windsor (London), with its forthcoming DataClub distributed database. DataClub can spread over a network of Macs so that users -- both programmers and end-users -- need never be aware of precisely where the data is residing. The system installers, however, do know, and make the initial decision about how to parcel out the data over the network. From then on, the system handles data access; processing takes place wherever the task was initiated after the queried data is collected from wherever it sits. This solution is an elegant way of turning each machine into a partial server, matching processing power and memory to local storage with optimization to use the processing power that mostly lies idle on a network. Users slowed down by others' use of data on their machines can ask the network manager to move it elsewhere, but they can get quick local access to their own data and slower but still seamless access to data elsewhere without ever knowing the difference.

BSI was founded by Nick Powell in 1988. Formerly managing director of Relational Technology's UK operation, he saw a market opening for a start-up in the Mac market and wisely eschewed the OS/2 database wars. Also wisely, he has gone to Apple for support and marketing sponsorship, but prefers to retain his independence rather than be swallowed up. The company hopes to be shipping DataClub by mid-1990 after beginning demos late this year.

CASE NOTES: NeXT

NeXT may be the next Mac or it may be a Lisa, but it points the way that others are only talking about. For starters, it's tough to place the product in this survey, since it incorporates both hardware and software. You could argue, as many have, that the company chose the wrong chip (Motorola's 68030), the wrong object-oriented language (Objective-C from Stepstone), the wrong window manager (not X) and user interface (not PM/Motif) and the wrong operating system (yet another variant of UNIX), but it has put them together in a coherent, powerful whole. The outcome depends in large part on IBM's willingness to market that assemblage vigorously.

SOFTWARE PLATFORMS

Software platforms come in a profusion of layers: For development there are languages, databases, data-exchange and communications interfaces, and (on occasion) object-oriented development tools and databases. For execution, there are operating systems and environments, databases and user interfaces, among other layers. A user interface may be built directly, or by using a toolkit with a set of configurable, reusable widgets for items such as dialogue boxes, menus, scroll bars and radio buttons. Sun's new XView toolkit and HyperCard are some current examples; the forthcoming toolkits for OSF Motif are another.

Operating systems: DOS splits as UNIX unifies

The lag in support for OS/2 has led to a resurgence of interest in both DOS and UNIX. Oddly, just as UNIX is coalescing into a couple of standard implementations, DOS is dividing into a melange of different access managers, memory managers, environments and hardware configurations. (See page 22.) OS/2 has lost some momentum as the press pays close attention to the lull before the storm, and the toolkits that will deliver on its promise of ease of use make their way only slowly to developers.

In the end, sure, everyone will use OS/2 or UNIX even at the desktop, if only to overcome the memory shortage that occurs when you try to do anything on a DOS pc loaded up with network software. The 8-megabyte requirement people complain about today will look as trivial by then as 640K does now. (Remember when products were supposed to run within 256K to reach the masses?) Yes, systems are getting more complex: They do more.

But DOS itself (with an installed base around 20 million) still gets a lot of support from third parties providing the very front-ends that are segmenting and dividing the DOS market. These are the access managers that are really applications on top of DOS, such as **Tandy's DeskMate, Brightbill-Roberts' HyperPAD, Traveling Software's ViewLink, Lotus' Magellan** and even (in its simplest form) **Hewlett-Packard's NewWave**. (See **Release 1.0**, 89-1.) HyperPAD and NewWave (and HyperCard, on the Mac) also include programming tools for building front-ends to applications and even complete applications. They serve to illuminate the coming lack of distinction between applications, sequences of functions, collections of functions, subroutines, even objects. (That is, WYAIHYC, or what you are is how you're called.) Other add-ons to DOS are memory extenders and expanders; "pull-ins," which let other systems run DOS, include VP/IX from Interactive Systems and Merge 386 from Locus.

It's probably going to be a long time before either UNIX or OS/2 displaces DOS on the workstation, which means that the battle will be waged first on the server, where UNIX has a lead. Moreover, the availability of a simple, straightforward UNIX implementation on the 386 (**Open Desktop** from Santa Cruz Operation, including Merge 386) should help attract new developers who want the full power of a 386, as will forthcoming announcements by **Sun** and forthcoming Sun clones using technology from **Phoenix Technologies.**

Operating systems: UNIX vs. UNIX

UNIX is looking more and more appealing to developers and customers alike. They couldn't live with 57 varieties, but they can certainly handle two. It's the violence, not the minor differences, that disturbs people. Both the **Open Software Foundation** and UNIX International now seem eager for some accommodation, although under veteran businessman **David Tory**, OSF takes the position that competition with implementations of a standard is healthy, whereas before its ostensible goal was to rally the industry around a single implementation. In fact, OS/2 probably offers enough competition that we don't need to worry about enough competition *within* the UNIX market.

Motif, the interface that won OSF's endorsement, will be a programming environment plus the PM style guide and a set of PM-style widgets that could be used to create a UNIX shell or the interface to a UNIX application. For the

moment, OSF and HP/**Microsoft** seem to have won the interface PR battle, but **Open Look** toolkits and the Sun personal tools are shipping now and new Sun systems are shipping soon, while Motif and Open Desktop are still in development. In the end, both OSF and UNIX International are AT&T customers, and most toolkit vendors will probably support both user interfaces; maybe users will even get a choice! If Motif does take over, the chief loser would be Sun, which has invested heavily in Open Look, but its machines can run Motif as well as anyone's.[2] Also, Sun (in the person of **Bill Joy**) is now free to go off and develop a new-generation operating system on its own, without interference from AT&T or customers. (You need customers to improve a product but not to dream it up in the first place.) It's that operating system, rather than the addition of objects and optical disks to existing systems, that is likely to provide real competition for **NeXT** in the years ahead.

Operating systems: UNIX vs. OS/2

Whether you prefer OS/2 or UNIX for the future seems to depend mostly on where you were in the past. DOS developers feel comfortable moving to OS/2; UNIX developers feel comfortable staying on UNIX and anticipating a world with less porting and at most two user interfaces. Overall, DOS developers are better at individual productivity applications, while UNIX developers are better not just at technical applications but at server-based applications and groupware. If you believe with us that groupware tools will be the source of competitive advantage to lure people from DOS, the UNIX platform has an advantage. Existing UNIX groupware includes DocuForum from Marae Groupware and Intelligent Documentation from Cimlinc.

Building interfaces: Pardon me, your layers are showing

Do we really want the whole world to look like Presentation Manager? some people have asked. We suspect that in the end there will be far more variability among different implementations of these supposed standards than anyone expects, and our eyes will get better at seeing fine distinctions.

Customers may want a single interface, but they are unlikely all to agree on which one. That becomes a minor problem, however, if programmers can use a common interface. That's the promise behind toolkits which translate the same call into interface objects in any of a selection of styles. The semantics of a menu are the same whether it appears on a pull-down window, in a scrolling list or as numbered items in the middle of a text-only screen. These object-oriented toolkits, which will theoretically let you move easily from one graphical environment to another, render the commotion about the user interface of diminishing interest. Vendors of such tools include V.I. Corporation, Micrografx (Mirror) and The Whitewater Group (Actor), but none is in widespread use.

In the same way, in another part of the stack of layers, all the database vendors are promising that their databases will run everywhere, and some (such as **Microrim**) are also promising a single API that will automatically generate graphics front-ends for each environment. One start-up problem with all these systems is you've probably already done the application for one environment, so you'll have to rewrite either way -- either for the

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2Any sort of victory by Apple in the Apple/Microsoft-HP lawsuit could work in Open Look's favor -- and to the disadvantage of OSF Motif.

toolkit to get both new versions, or directly for the new environment (the old way). In the future, as people think about these things beforehand, such tools will make a difference by reducing the costs of difference.

Meanwhile, there are things that just don't translate well. In particular, OS/2 Presentation Manager and Mac's and NeXT's interfaces are synchronous and assume that the user's input and its display are handled locally, whereas X-based systems are designed to execute equally well (or poorly) across a wire. That's why it's easy enough to build something that *looks like* Presentation Manager on top of UNIX (Hewlett-Packard/Microsoft's CXI) but much harder to build something on top of X (PMX) that will take the same programming calls as PM and still react naturally to mouse input. Once that is done, programmers will have to code only once to get the same user interface in either OS/2 or UNIX.

In the end, developers still have a problem: Deciding decide which toolkit to use to reach all these environments effectively. If the toolkits work, it becomes a matter of the developer's own choice of tool, rather than a marketplace selection decision. Obviously, a good tool makes a lot of difference, and a poor tool may leave the developer unsupported as the target environments change and the tool developer lacks the resources to catch up.

Object-oriented environments: O(bject)S/2 and Hewlett-Packard's NewWave

While the UNIX folks are struggling to establish a coherent, fixed UNIX environment complete with user interface and communications standards, **Microsoft** is moving ahead with plans for a full-scale suite of object-oriented tools and facilities. The details of Microsoft's implementation aren't yet ready for developers, but the outline is clear enough.[3] The first phase will be the installable file system, with Microsoft providing the first one -- a more hierarchical, flexible file manager with facilities for multiple attributes, object handles and the like. This will provide room for vendors to offer their own special-purpose file systems.

The full system will include operating system support for objects, C++ and an object-oriented extension of BASIC (visual BASIC) which could be the central control language. Alternatives for the control language include variants of REXX from IBM, Agent Language from HP and LEAF from Lotus.

Meanwhile, **NewWave**'s problem is that **Hewlett-Packard** doesn't own the operating system; Microsoft does. For each component HP has the option of doing something nonstandard, waiting for Microsoft to do something, or persuading Microsoft to adopt what it has done -- exactly how much of each remains to be seen, and depends (as usual) on **Microsoft**. In the UNIX environment, HP is freer (and might have something to offer to OSF), but it needs to keep things the same from platform to platform. NewWave already has its own Agent Language which concatenates sequences of actions by the applications that run in its environment and lets users build routines for triggers, system monitoring (as in computer-based training or smart help systems) and conditional, data-driven operation. For example, you can have the agent do different things depending on the values of the data it receives or finds in

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3*Unlike applications, systems software is properly announced at the vaporous stage, so that the vendor has time to garner support and the ISVs have time to plan ahead.*

a file, and send data or messages to different users depending on the time of day, who is logged on, or any other condition. The agent can watch a user's keystrokes or, in some cases, understand application semantics.

Call NewWave the development environment that grows. It's gaining support from a variety of hardware vendors and customers such as American Airlines and Boeing, but it's lagging in attracting application developers beyond small ones such as **Geovision** and T/Maker (and Microsoft for Excel only). The company has solved some of the developer's problems by forging an alliance with CaseWorks for its CASE:W, a toolkit with a supply of Windows and soon PM widgets. NewWave can bind these widgets to NewWave objects such as files and data elements and functions and to its Agent Language scripts.

HP is extending NewWave to run easily over networks and encompass UNIX and OS/2 as well as DOS (using PM and Motif; HP is an enthusiastic member of the Open Software Foundation). HP will also smarten up its agents, hide all the layers underneath itself, foster the development of third-party object libraries and applications, and work on marketing/distribution issues.

Object-oriented languages and objects in general

While object-oriented languages aren't yet in wide enough use to excite general controversy or to have developed to the point where they *ought* to be standardized, the market is coalescing rapidly around C++, the extended C language developed by Bjarne Stroustrup at AT&T, despite complaints about its various inadequacies. **Microsoft** intimates that it will offer a C++ compiler rather than the nonstandard C# ("C-sharp," with one + shifted slightly) it once planned. It seems likely that HP's language of choice for finer-grained operations than its Agent Language handles will be C++, and almost all the object-oriented database vendors are adopting C++ (see **Release 1.0**, 88-12). Does this foretell the Open Language Foundation?

The other languages may get few complaints because they have few users. Only Stepstone's Objective-C, the object-oriented language of choice for the NeXT machine and the foundation of the NextStep development environment, seems to have much hope of success -- especially if IBM pushes it heavily. However, we can't see any of the standards bodies picking it, and IBM is at least partially committed to the choices of the Open Software Foundation. The remaining competitors, despite valiant efforts from Interactive Software Engineering (Eiffel) and Complete Computer (Complete C) and **ParcPlace Systems (Smalltalk)**, have limited followings (see **Release 1.0**, 88-9). Perhaps their vendors should apply their talents to remedying C++'s acknowledged deficiencies. ParcPlace Systems, for one, is now selling C-oriented development tools.

All in all, the world is much too rich to model with relational databases and spreadsheets. There are lots of approaches to building things at a level users can understand and manipulate easily, everything from object-oriented languages to object-oriented databases, multi-media tools and the like. As the tools get better the users will also get "smarter." Familiarity breeds intuition, so to speak. Just as rows and columns now seem "intuitive" -- which they did not in 1980 -- so will entity-relationship diagrams, tree structures, control/message flows and the whole notion of objects and classes. They already seem a lot more intuitive than files and exe files and subroutines to us, at least.

THE TOOLS: DATABASES/DATA ACCESS

Software vendors worry about porting their software to new environments: Which one first? For many developers of business software, the answer is simple: Pick a database vendor, and let that company worry about the profusion of platforms. (True, you do have to pick the database, although most databases now come layered -- that is, with clients and servers -- so that any front-end can talk to any back-end.) Suppose, for example, you have a project-management package. It has its own unique data structures, and is optimized to run under DOS. But now you want to port it to one of the new environments. What to do?

The first thing is to separate out the application-dependent data structures, and figure out how to store all your data in standard relational form. To some extent, you can use the database tools to rebuild your application -- again, gaining the benefit of portability. (You will no doubt have to do some fine-tuning and application-specific logic by hand.) Henceforth, users will load the data into your unique structures only while running the application. That will give them the benefit of all the database features, such as integrity, record-locking, and of course the ability to run your application in any hardware/software environment that database runs in -- without your doing any work. While the users may see some degradation in performance, you will gain from standardizing on a third-party platform. Now it's the database vendor's job to insulate you from changes in platforms and to continue to enhance the performance and capabilities of the database -- an onerous task if you were to do it yourself.

In addition, you will find that your project-management package now integrates easily with tools from other vendors. They can analyze your data in other ways, send it around with e-mail, print it with a special database-publishing tool or incorporate it into documents.

Which database to choose? Right now the system of choice seems to be **Sybase**, moving up fast with a little help from its friends to the north and south. Other contenders include Gupta, which supplied the engine for Lotus, and of course Oracle and Ingres from RTI. RTI has pulled off a coup by including its database in Santa Cruz Operation's **Open Desktop** package (to be shown at the **Tandy** session) -- the modern equivalent of how WordStar established itself through bundling deals perhaps. **Microrim**, which has mainframe forebears, will be offering **Atlas**, a new front-end that will hook you nicely into any back-end. Indeed, virtually all database vendors are promising total interoperability and distributed operation (with the ability to execute transactions remotely with data drawn from several different brands of database). Use our front-end to reach any back-end, they offer, and use our back-end to forward requests to any other back-end. For the moment, however, **Ashton-Tate** has its hands full communicating with Sybase in SQL. The dBASE third parties, notably **WordTech** and **Fox Software**, also plan to have SQL capabilities (A-T's SQL comes mostly from WordTech via a legal agreement, as it happens). WordTech is also working on a UNIX version. Fox's new **FoxPro** understands the dBASE IV language but looks like Fox's Mac product, now in its second release. (Fox has been sued by Ashton-Tate; see **Release 1.0**, 88-12.)

For non-programmers, **Alpha Software** has **Alpha Four**, a relational database which may not qualify as such under the most stringent rules, but which pro-

vides most of the relevant advantages and can join up to 10 tables. Approaching the market from the low end with a continually improving product (hence the name) that can use dBASE files, Alpha recognizes that ease of use requires sophistication underneath. Alpha Four uses visual programming tools (sort of linking by example) to make the structure of the table joins clear with boxes and links. The user builds an outline to define and show the menu structure of the application; each line in the outline is a menu selection from the program.

Finally, **Interbase**, the company that Ashton-Tate has invested in, exemplifies our thesis that database applications will handle more than text strings and numbers in the future -- as long as we have tools to do so. Its product **InterBase** supports such applications, for what the company calls "online complex processing."

Retrofit technology

For those who don't want to start over and prefer retrofit technology (see **Release 1.0**, 88-5), there's **DB/Access**, which offers connectivity without the temerity to make customers purchase a new database or front-end. Connectivity to mainframe data structures as well as relational databases is DB/Access's specialty. The company, which sells direct and (for the pc portion of its two-part links) through Businessland, is broadening its Access/Star product line with a distribution agreement for **Lotus's The Application Connection**.

One company, **Channel Computing**, offers a similar service for remote spreadsheets and databases (Oracle, HP, DEC, AS/400, etc.), but builds on that to create a novel, useful application. The value of Channel's **Forest & Trees** lies not in its connectivity (which we tend to take for granted nowadays even though it's easier promised than done) but in its process-control front-end. It answers the question "What is?" not "What if?" Basically, the user chooses the data sets he cares about, and builds a path to each of them using F&T's connection tools. Data from any number of sources can be combined into ratios and other expressions calculated locally. The user can display them on the screen constantly or get updates any time he reloads. Any expression can be broken down to its constituent parts. But the best thing is that the system *monitors* these values, and flashes or beeps when they go outside target values set by the user.

Of course, you could program this yourself. The achievement of Forest & Trees is to make it easy. (We have scheduled the company sessions so that Channel and DB/Access can attend each other's briefings.)

AI TOOLS

Most AI companies haven't had a good year, but AI itself is doing fine. In fact, the better it does, the less likely people are to buy it from a certified AI company -- which is why **Aion** is focusing on being a "design, development, delivery and maintenance" tool company, KnowledgePro is positioning itself more as hypertext, and IntelliCorp is looking to align (or was that ally?) itself with some database vendors. (Aion's presentation, however, will cover the wisdom president **Harry Reinstein** has gained building cooperative processing applications. Aion's **ADS** works almost identically on mainframes and pcs, and the two systems can work cooperatively with each other using LU 6.2. In a previous life, Reinstein led development of the precursor to IBM's mainframe-based Expert Systems Environment.)

While the big growth in expert systems over the past couple of years has been in simple rule-based systems for pcs (such as Paperback Software's VP Expert) or higher-end ones that could be embedded into existing applications (such as **Neuron Data's Nexpert**, Aion's ADS and Focus's Level Five), these applications could be generated by a tool such as Logic Gem (below). The future belongs not to the code generators but to rich modeling and development environments such as Neuron Data's **Nexpert Object and Nextra** and IntelliCorp's KEE and derivatives thereof. (IntelliCorp needed to change its platform and selling strategies to focus more on mainstream environments, and it has, but IntelliCorp's products are already exactly where the market is heading.)

Neuron Data is doing well addressing the market for embedded systems with Nexpert Object, a stunningly beautiful (like all its tools) expert system shell that displays everything graphically -- rule hierarchies, object relationships, etc. Some competitors criticize Nexpert because it's a shell rather than a language and therefore limits users to some extent -- but most customers consider that a major advantage. In addition, Neuron is about to release Nextra, a powerful thinking tool analyzed in our February issue. (It took us four pages to describe with pictures, so come take a look!)

AICorp, with roots and management from the mainframe community, is giving the expert system shell vendors some tough competition in the MIS world -- for example, Burlington Northern for scheduling, MCI for marketing, Mass Mutual and Liberty Mutual for underwriting, the Army and Air Force for logistics. AICorp has 20-plus installations of its **KBMS** on mainframes, but is seeing its base grow more rapidly with the release of a $9500 pc version last month. That product has already generated a dozen sales, mostly to new customers. AICorp, with the youngest product, has managed to combine some of the best features of its competitors, including object orientation and mainframe support, and enhanced them with AI-SQL. In this architecture, the rules and objects stay in the knowledge base, which looks just like an ordinary relational database to the outside world, and deliver regular-looking data in response to regular-looking SQL calls. To work directly with the knowledge base, users can use AICorp's development tools or its user-friendly interactive mode.

CASE STUDY: LOGIC GEM

Our friend Burt Grad always sniffs when we talk about expert systems and says, "What's the difference between that and logic tables?" We never knew enough to answer, but a new program that creates logic tables has helped. Logic Gem, which is not an expert system but can be used to help build one, clarifies both the strengths and weaknesses of expert systems. An expert system is an application that executes logic, but it is more than just logic: It's interactive, it provides help, it may have goals, etc. On the other hand, there's no match for Logic Gem in developing the logic embodied in an expert system. It lets you see your logic, and helps you execute it in the optimal order, and load it into any other application.

There's a finite number of possibilities in any rule-based system -- but it does grow rapidly with the number of rules. (Two yes-no rules gives you four possibilities; three gives you eight; and so forth. The actual number is 2^n for n rules. If there are three possibilities, the number is 3^n, and so forth.) Of course, in real life some rules may be redundant or incompatible: If the patient is a man, there's no possibility that he's pregnant (but then maybe it's not a man after all).

Start

	1	2	3	4	5	6
Anxious to start?	y	y	y	n	n	n
Willing to read a bunch?	y	n	n	n	y	n
Willing to read a little?	–	y	n	y	–	n
Copy LG.EXE and LGCONFIG to your directory.	1	1	1	1		
Read 'How Logic Tables Work' in *User's Guide*.	2	2		2		
Scan *Reference Guide* (especially editing policies).	3					
Read all documentation.					1	
Run 'LG' on your PC.	4	3	2			
Go do something else.				3	2	1

It's always nice to see a product in use; this decision table introduces Logic Gem's manual.

VisiLogic?

As we pointed out in our article on AI^2 (see **Release 1.0**, 88-12), the problem with building expert systems isn't the rules themselves, but validating the logic behind the rules to make sure it's complete and consistent. AI^2's IDEA does this by constructing an expert system from first principles, based on a model of the item under review; **Logic Gem**, a new tool developed by **New Shoes Software** and published by **Sterling Castle**, does it by leading the user to compose a decision table, where flaws in logic are apparent and can be discovered by the program and remedied by the user. Each set of conditions (or rules) results in one or more actions (or results). The top columns display the sets of conditions; the columns immediately below display the resulting actions. (See illustrations across.)

Logic Gem prompts you to consider or explicitly eliminate all the possible sets of conditions, and finds situations that are redundant or ambiguous. When the table is complete, the program can turn it into a variety of forms, including compilable C, Pascal, dBASE, FORTRAN or BASIC, or a somewhat stilted English. If you name your rules (or condition sets), they are included as comments in the listings. These executable, forward-chaining modules can be used in or called by "regular" procedural programs.

Logic Gem itself also has an interpretive mode, which works like a forward-chaining expert system (especially if you take the time to build user-

friendly menus for it). This is not a typical expert system shell, since it does not do backward chaining, but Logic Gem output could be exported as rules into an inference engine for backward-chaining (with some tweaking).

For optimization, Logic Gem allows you to assign frequency and costs to each rule. This comes in handy because you can tell it to order the rules by either of these. You can speed execution by causing the most likely rules to fire first: Alice is more likely to be calling for help with her printer than with WonderWord itself. And you can minimize testing costs by doing the cheapest tests first: Check the plug in back before you dismantle the whole computer. (Come to think of it, the check-the-plug rule is not just cheap but also more likely to return a yes than any other.)

Logic Gem costs $198 and runs in 640K (with under 200K of code). It was written in C and could easily be ported, given its bare-bones interface. In fact, developer **Jim McCarthy** originally wrote it for UNIX and showed it in a very early CP/M implementation to Sorcim among others. McCarthy was a system engineer in AT&T's Data Systems Group until quitting this January 1 to devote himself to setting up New Shoes and marketing Logic Gem fulltime. (He might be able to give **Bob Kavner** some useful insight from the ranks.)

TABLE: parser.tab — LABEL 1
RULE — COMP: 128 : 128

		M	1	2	3	4	5	6	7	8
C1	length == 1	2	y	n	n	n	n	n	n	n
C2	c == '\n'	2	–	y	n	n	n	n	n	n
C3	c == BACKSPACE	2	–	–	y	y	n	n	n	n
C4	i == 0	2	–	–	y	n	–	–	–	–
C5	typ == NUMERIC	2	–	–	–	–	–	y	y	n
C6	isdigit(c)	2	–	–	–	–	–	y	n	–
C7	i == length	2	–	–	–	–	y	n	n	n
A1	beep()				1		1		1	
A2	addch(c);refresh()		1					1		1
A3	str[i]= c		2					2		2
A4	str[i+1] = '\0'		3					3		3
A5	backup(1)					1				
A6	i++							4		4
A7	break		4	1						
	Frequency		20	10	1	2	5	20	2	40
	Cost		0	0	0	0	0	0	0	0

A Logically Complete and Mechanically Perfect Table

The Logic Editor is an electronic decision table structured like a spreadsheet to allow the programmer to design a series of independent conditions and actions which together describe the logic your program should follow. The Logic Editor:

- Automatically completes the logic if your table is incomplete.
- Automatically generates a mechanically perfect set of rules for you to edit.
- Eliminates redundant or contradictory rules.
- Reduces sorts and optimizes logic.

```
Procedure: parser.tab
1.  If length == 1 is true, then do the following:
        1) addch (c); refresh()
        2) str [i] = c
        3) str [i+1] ='\0'
        4) i++

2.  If length == 1 is not true, and c == '\n' is true, then do the following:
        1) break

3.  If length == 1 is not true, and c == '\n' is not true, and c == BACKSPACE is true, and i == 0
    true, then do the following:
        1) beep()

4.  If length == 1 is not true, and c == '\n' is not true, and c == BACKSPACE is true, and i ==
    not true, then do the following:
        1) backup (1)

5.  If length == 1 is not true, and c == '\n' is not true, and c == BACKSPACE is not true i == le
    is true, then do the following:
        1) beep()
```

A Section of a Logic Table Translated into English for Documenting Procedures

```
if (!(length == 1))    {
    if (!(c == '\n'))    {
        if (!(c == BACKSPACE))    {
            if (!(typ == NUMERIC))    {
                if (!(i == length    ))    {
                    addch(c);refresh( );
                    str[i] = c  ;
                    str[i+1]='\0' ;
                    i++    ;
                }
                else    {
                    beep( ):
                }
            }
            else if (!(i == length))    {
                if (isdigit(c))    {
                    addch(c);refresh( );
                    str[i] = c  ;
                    str[i+1]='\0' ;
                    i++    ;
                }
                else    {
                    beep( ):
                }
            }
            else    {
                beep( ) ;
            }
        }
        else if (!(i == 0    ))    {
            backup(1) ;
        }
        else    {
            beep( ) ;
        }
    }
    else    {
        break ;
    }
}
else    {
    addch(c) ;refresh( ) ;
    str[i] = c  ;
    str[i+1]='\0' ;
    break ;
}
}
```

A Logic Table Translated into the Language of Your Choice

NEW APPLICATIONS

Given a world where the new platform is a network of pcs/workstations, it makes sense that many of the leading new applications will be groupware. Most other applications can run just as well (and already do) on standard old pcs. Other applications will make use of the improved graphical capabilities on the new generation of hardware not just for display of images, but for graphical diagramming tools, visual programming, maps and the like. Finally, the cumulative result of all the pcs and word-processing packages installed over the past decade has been the growth of enormous amounts of documents online. (Call it the rice-bowl, a complement to the 80 billion lines of spaghetti code.) Tools/applications to make sense of that rice-bowl, and to generate more rice, will flourish in the years ahead.

Groupware: Linking people, not just nodes

Groupware is anything a marketer says it is, but in useful form it is applications that take the network and its nodes, rather than the nodes alone, as their platform. Because all groups (like unhappy marriages) are unique, most groupware will be sold as configurable applications, such as **Lotus Notes** or **Action Technology's The Coordinator**, or, even more frequently, as groupware-construction tools, such as Action Technology's forthcoming development tool, **Coordination Technology's Community** and **WorkFlow Systems' Calypso**. A number of text products such as **Verity's Topic** and Lotus Notes are designed with groups of people sharing documents in mind; other products such as **Folio's Views** and **Persoft's IZE** will join this group when they come up with server versions. **Wang's Freestyle** fosters communication among people; it does not manipulate data the way the rest of these programs do, but it greatly simplifies the task of moving it about.

Our basic notion of groupware is software that tracks people and activities -- the analogue of the software that controls the assembly line, not the individual work cells, in a factory. Groupware manages work-in-process, work delegation, monitors completion (or delays) and routes tasks from person to person in the appropriate sequence, which may change dynamically according to circumstances in the workgroup or in the content of the work itself. Budget request too high? Send it to Alice. Fred out of town? Route it to Juan. Deadline approaching? Send a message to Emily, and offer to load the right files so she can finish the task right away. (See **Release 1.0**, 88-6.)

The underlying tool for much groupware will be database -- although it may well look to the user like mail. (In fact, most mail will ultimately be managed by databases too; an early example is Oracle Mail, described in our 88-5 issue as SQL*Mail.) Obviously, a traditional relational database can only record transactions and point to rich content; object-oriented databases in the future will be able to manage the work content itself.

Aside from database underpinnings, another prerequisite for groupware is the ability of applications to communicate easily. That's one benefit of Microsoft's dynamic data exchange (aside from OS/2, which lets them do so actively rather than trade files or clipboard contents asynchronously) and NewWave. Application vendors such as **Software Publishing**, **Claris** and **Lotus** are paying special attention to fostering compatibility among their applications so they'll be ready when the day arrives. However, we're still waiting for the integration of Lotus Agenda and Notes, which are outside Lotus's

data-oriented mainstream glued together by LEAF, for Lotus Enhanced Application Facility. One of the problems with Agenda and Notes is their closed-world nature -- in contrast to the help **Lotus Magellan** provides users in navigating their worlds.

Graphics where it makes sense

In general, we're not a big fan of graphics when that means cryptic icons all over the place. But a screen (or a printout) is a great place to display and clarify relationships and sequence by the careful arrangement and connection of objects. In the case of **Logic Gem**, above, those objects are mostly text representing rules and decisions, and some lines to keep things straight. In an outliner (or structured code), all you need is text and white space, with the odd number or punctuation mark.

Saber carries the idea a little farther in **Saber-C** by using the rich Sun environment to display the interconnections of code elements, with tree browsers, pop-up boxes and menus and other visual cues. It also contains an incremental compiler and enough logic to detect most bugs in source code, and point them out interactively. **Clear Software's Clear** employs a similar parsing capability, against dBASE and C code, but without the interactivity, to generate flow charts and structure charts.

Premise's DesignView, a CAD package that will ship shortly, is more than just yet another drawing package. It uses constraint-based modeling: You specify the interrelationships of the objects you're creating (relative sizes, angles, tangencies and other geometrical relationships) and it maintains them. It's like a drafting spreadsheet: As you change one item, the others change according to the rules or equations you've created to link them.

MapInfo and Geovision are more typical of graphics packages since they use graphics to visualize detailed data rather than relationships and structure. Both are excellent examples of what you can do when you handle space and geography as information that can be manipulated by computer, rather than meaningless strings specifying locations in a database or images on a screen. These packages can determine distances and areas, pick routes and otherwise create and run geography-dependent applications.

Finally, there's **MacroMind**, a transplant from the arts and music world whose time is coming (and which has responded by hiring businessman **John Scull** from Apple to back up "creative" founder **Marc Canter**). There is meaning in data presentation as well as representation; one of MacroMind's contributions is the element of time, for simulations (prototypes of moving products such as auto dashboards), interactive, animated presentations and courseware. Just think how nice the progression on page 3 would look as an animation! One of MacroMind's biggest challenges is convincing the world that its products (VideoWorks and now Director) are not hard to use; in fact, they let you plan out your creation with something like a GANTT chart (the "score," as in music), which lets you describe and control the behavior of up to 24 separate objects and synchronize it to sound frame by frame. (Director also has dissolves, tempo, MIDI connections and other things.)

New applications: Text tools

Text is the medium of many new exciting applications. While database-based groupware can control the transactions among members of a group, they will still need text to communicate anything other than rigidly structured ideas and information. Hence **Lotus Notes** (for example).

Except for editing tools such as Broderbund's ForComment and Marae Groupware's DocuForum (bought from NETI and still distributed by AT&T among others), most text *tools* (as opposed to archive and retrieval systems) tend to be focused on single users, although they could come in handy for helping users to make sense of text generated by others.

An important step in the evolution of text tools will be general adoption of layered architectures, keeping text and indexes separate from the tools that manipulate them, much as a database keeps data separate from the structures that store and manipulate *it*. That will make for easier transfer of text from one tool to another. It will also foster the development of server versions, so that text can be shared and its integrity maintained with safeguards similar to those that now protect data.

Two products, **Verity's Topic** and **Folio Corp.'s Folio**, show the first intimations of such evolution (see below). Meanwhile, **Persoft** is about to announce a server version of **IZE**, which will allow users to impose file-level concurrency controls on their IZE text bases. IZE performs automatic classification of text blocks and organizes them into a hierarchy that can be restructured and otherwise manipulated by users. Persoft is also working on a runtime version of IZE for publishers to use in distributing textbases.

SoftQuad and **Avalanche** handle the two sides of the text-object business: Avalanche recognizes them, and SoftQuad enables you to mark them so that another system can either display or print them properly (according to the rules of a composition system) or collect them for some other purpose, such as generating an index, table of contents, or creating hypertext links to all proper names in a company newsletter.

Story lines and story problems *(thanks, Chris!)*

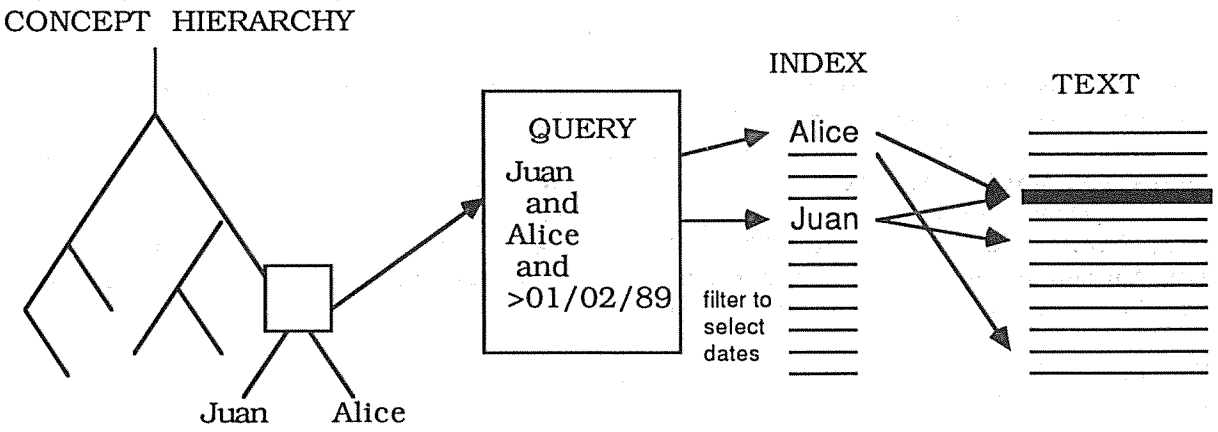
Most text tools deal with what a piece of text is *about*, rather than what it says. For example, in a story problem -- "If Alice has five apples and gives three to Juan..." -- they could recognize the variables (Alice, Juan, apples) but not the equation to solve it. In a story treatment, they could again recognize Juan and Alice, but not whether boy gets girl or boy loses girl. Extraction of meaning, story lines and relationships rather than just topics and data, is the goal of **Natural Language Incorporated**, 7 percent owned by Microsoft. NLI's **Connector** is a tool for building an object-oriented data structure that models a domain so that NLI's **DataTalker** system can interpret user queries, fetch appropriate data from any SQL database, and generate appropriate language back. The knowledge-acquisition tools of **Neuron Data's Nextra**, come to think of it, could come in handy for building a DataTalker model, or an index for Verity.

CASE STUDIES: TOPIC AND FOLIO

About a year and a half ago (87-9 and 87-11) we lamented the lack of powerful hypertext tools -- systems that would make it easier for people to create and use hypertext. As a gross overgeneralization, we'd say that the people who have glommed on to hypertext so far are the equivalent of artists who love handcrafting art. But to make it into a mass market, we need the equivalent of page-layout and more automated programs, to make automatic art the province of Juan and Alice. Now we're seeing some...

Verity's Topic is a powerful tool for building concept hierarchies and linking them to text bases through a standard index. (Unfortunately, the tool doesn't help in the construction of the concept hierarchy as much as it might; Nextra might be a help here.) The user creates a concept hierarchy, which is a guide to the domain being searched. Thus, for example, if you asked for France it would also pick up items below it in a hierarchy, such as Paris, Jean-Paul Sartre and croissants; if you asked for Alice it would pick up all the projects and people reporting to her. And of course you can do Booleans on the concepts too: All the projects both Alice and Juan are working on, or Alice's except the ones Juan is involved with.

The concept hierarchy is linked to predefined queries that can be executed against any indexed text base. For the moment, the queries are Boolean combinations of the words that comprise the lowest-level nodes of the hierarchy (and their synonyms). Because they are queries rather than static hypertext links, it's easy to update the system (through automatic indexing) when new text is added. In a similar vein, the queries themselves could be refined and needn't be Boolean searches (although such an extension isn't yet supported); they could be SQL statements or similarity searches such as those performed by Third Eye Software or Thinking Machines Corp. (as in the Dow Jones application; see **Release 1.0**, 88-1).

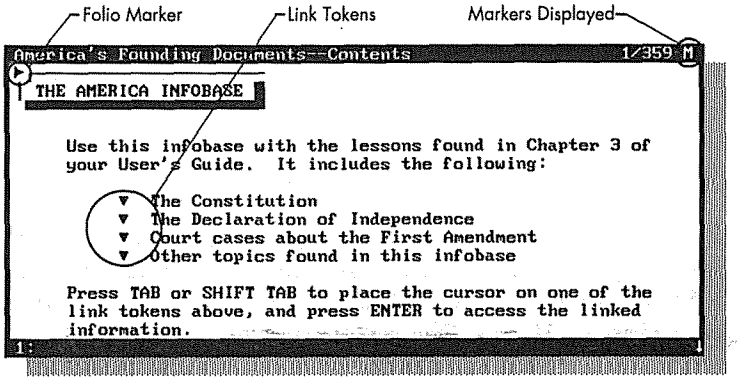


Conceptually, you have a system of three parts plus a "non-conceptual" index, as shown above: A concept/domain hierarchy that models the user's world (left); the text base (right); and a set of queries that links the user's domain and the text base. The inverted-file index is solely for con-

venience in linking the query to the matching text; it has no semantic identity and could be replaced with fast string search or direct memory access as in the Connection Machine application. Any component/layer of the system can be changed independently; automatic reindexing (not easy to do while the system is in use but fine overnight) establishes the correct links between domains and text base without user intervention.

Folio's Views

While **Topic** is targeted to readers of existing texts, **Folio Corporation's Views** is more of an editor's and writer's tool that focuses on manipulation rather than retrieval of text -- although that's more a question of intent and ease than of capability. Views can also be used to publish the text once it is organized; indeed that is the way the product is used by **Novell** in the help system for **NetWare** (under a special OEM license).

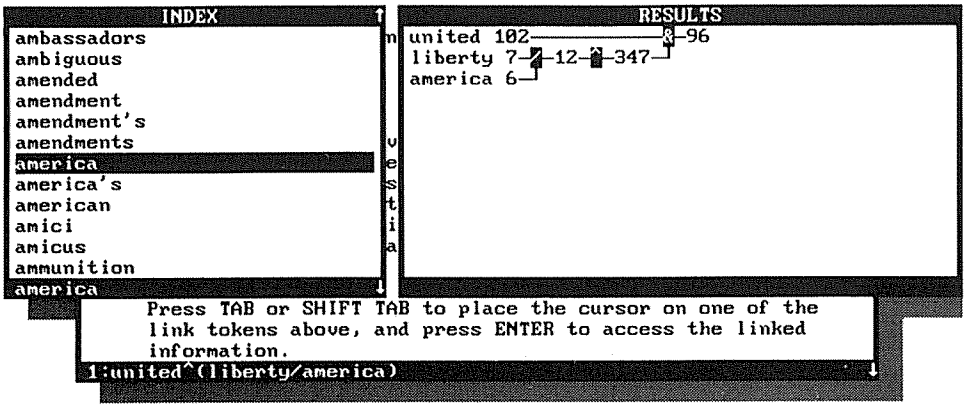

Folio Marker
Link Tokens
Markers Displayed
America's Founding Documents--Contents
1/359 M
THE AMERICA INFOBASE
Use this infobase with the lessons found in Chapter 3 of your User's Guide. It includes the following:
The Constitution
The Declaration of Independence
Court cases about the First Amendment
Other topics found in this infobase
Press TAB or SHIFT TAB to place the cursor on one of the link tokens above, and press ENTER to access the linked information.

Views ($495 stand-alone, $695 per server and $150 per node) gives users fine-grained yet powerful access to huge textbases, combining text search capabilities with the expand-contract capability of an outliner and the criteria-selection approach of a database. But, to start at the beginning, Views divides any piece of text into manageable chunks, or "folios" -- using natural markers such as paragraph divisions, tables or headings as the user specifies. Or the user can separate the chunks by hand. They are managed as a single virtual DOS file up to a gigabyte in size, which amounts to even more because of Folio's compression capabilities, which reduce textbases by about 50 percent with an index included.

Each of the folios is part of a "view" -- a collection/sequence of chunks. The original view is simply all the chunks in a single file. Much like a database, Views allows you to select a new view by criteria -- any Boolean query for words, either in the body of the text or in the name of each folio. (Views doesn't yet allow you to attach attributes to chunks, as do, say, **InterBase**, or the new OS/2 file system.) You can also mark text folios for inclusion by hand, and sequence them in any order you wish. Each folio can be part of an arbitrary number of views.

You can build links from a word or section within a folio to a view, but not back again. Those links can be used to build a table of contents that can lead you directly to the views listed (a standard hypertext capability). The listing of views in each textbase is a basic version of this function. You can also use the "focus" command to get a summary list of all folios in a view, but Folio's hypertext isn't yet industrial-strength.

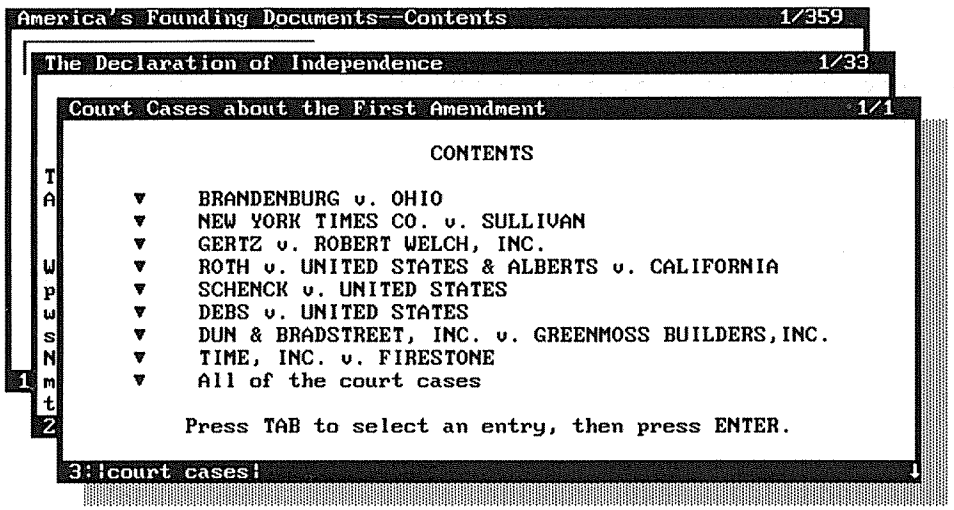
Although text-search by now seems almost passe, Views has a delightful way of displaying search results, as shown above across, to indicate the number of hits for each expression in a nested query. (Like Topic, Views should eventually be able to use similarity measures rather than Boolean queries.)



Overall, Views gives you great power in moving through and manipulating pieces of text without getting lost. Like Topic, it lets you manipulate a front-end without disturbing the structure and sequence of the text chunks lying underneath, as in Lotus Agenda. However, it lacks Agenda's automatic text-parsing capabilities and Conditions & Actions language, and is optimized to deal with long texts rather than Agenda's items.

While Views is extremely powerful, it still lacks integration facilities to extend it with the capabilities of other applications in any way other than clumsy file transfers. For example, it would be useful to be able to fill in a form that would select the appropriate folios to create a will, a marketing pitch or a resume tailored to a target employer.

Furthermore, Views needs a true server version. The software already works on a network, with a simple permission system by user ID that allows the creator of each folio to specify permissions for other people. If several people have write permission, the one who saves last wins. Views needs a better way of managing such events, of maintaining integrity between linked folios. But the product is eminently worth extending.


America's Founding Documents--Contents 1/359
The Declaration of Independence 1/33
Court Cases about the First Amendment 1/1
CONTENTS
BRANDENBURG v. OHIO
NEW YORK TIMES CO. v. SULLIVAN
GERTZ v. ROBERT WELCH, INC.
ROTH v. UNITED STATES & ALBERTS v. CALIFORNIA
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DEBS v. UNITED STATES
DUN & BRADSTREET, INC. v. GREENMOSS BUILDERS,INC.
TIME, INC. v. FIRESTONE
All of the court cases
Press TAB to select an entry, then press ENTER.
3:!court cases!

Figure 3-11. Multiple Views. VIEWS allows multiple views to display on the screen at once, the exact number depending on available memory in the computer.

DISTRIBUTION AND MARKET SEGMENTATION

What profiteth it a vendor if he hath the best mousetrap but knoweth not the distribution channel therefor?

While more and more software is running on personal computers, the tasks it performs are moving up-market. Many network-based applications (databases and groupware) require the same sort of support given to minicomputer applications in the past, claims of ease of use notwithstanding. (Database and network vendors keep protesting too loudly that we shouldn't use the phrase "-- administrator" in connection with their products.) The traditional channels are no longer suitable for many pc-based applications, especially the ones that will show up on OS/2 and UNIX. As **Corporate Software's Mort Rosenthal** warns: "It may be easier for the traditional mainframe and mini vendors to figure out what new [pc] products to build than for the pc vendors and resellers to learn to sell the new products."

CASE is an excellent example: It was one of the first MIS-style applications to show up on pcs -- and to be sold direct to vendors. It's a truism that CASE is not a product but a way of life: You have to observe the rules as well as use the software to get the full benefits. It just so happens that that applies to almost all mission-critical software: It doesn't just automate old patterns of behavior, but improves them and automates the *new* patterns. In the same way, factories aren't just assemblages of machines, but carefully planned facilities. And no one builds a factory by buying machines one at a time -- although there may well be workers who rely on their own favorite screwdriver.

So what should the distribution channel do about all this? The first item is to decide on your customer base. The second is to decide on your suppliers (unless, as Compaq did to Businessland, they decide for you). As products become more complex, resellers will have to devote more time to learning each vendor's suite, and won't be able to support as many. **Softsel**, for example, has started a special group to support UNIX products. The model by which the industry sells networks -- whereby most resellers service either Novell or 3Com but not both -- will extend to other product categories as well. Retailers, however, serviced by distributors such as the new, improved **Ingram Micro D**, will still be the major channel for standalone or replacement items, including DOS software, pcs and other system components. But as retail gains from the high end, it will lose at the low end to mail-order and telephone/modem sales. Software packages no doubt will include a telemarketing capability that can call a standard dial-up sequence in a user's dynamic-link library to call the vendor and upload the user's registration number and address. The session will show the user some enticing promotional copy and a menu: Option 1 is to order a second copy for a colleague or for home use; option 2 is to order the upgrade; and so forth.

CASE STUDY: LOTUS 1-2-3

While the UNIX world is obsessed with unifying UNIX and identifying (or imposing) a binary standard, the DOS-OS/2 world is splintering into a number of segments marked not just by architecture but by memory size and customer requirements.

In a world where the focus is hardware, it's easy to assume that one size of 1-2-3 will fit all, since it runs (so far) on all machines. However, market segmentation isn't a result just of processor architecture, but of customers' particular needs and capabilities. This is a fact that **Lotus**, for all its technical problems over the last few months, recognizes better than almost anyone. The 1-2-3 announcement to be delivered on Tuesday is one of the first to show a clear understanding of the marketing issues inherent in the profusion of new and old platforms. The technical challenge of fitting the new, enhanced 1-2-3 into DOS certainly underlay the company's decision to split it into several versions, but the resulting segmentation reflects reality nicely. In addition, the company offers a network pricing plan which, while not unique, helps solve pricing and distribution issues that will proliferate in the future.

1-2-3 2.2D and 1-2-3 3D?

1-2-3 will now come in three releases: 2.2 (a 512K-suggested, somewhat enhanced version with file linking, undo and some spreadsheet publishing tools); Release 3.0, the new three-dimensional standard, which runs on 286 or 386 machines in either extended DOS or character-mode OS/2; and 1-2-3 G, which uses OS/2 and PM. Release 3.0 can run either as an up-to-16-megabyte DOS application or an OS/2 application; it configures itself at the user's prompting. All three versions come in three "editions": standalone ("standard"), node ("PC/workstation") and server (prices and dates to be revealed Tuesday at separate events in Palm Springs, Cambridge and London).

	OS		
Memory	DOS	text OS/2	OS/2 + PM
512-640K	2.2		
1M+	3.0		
2-4M		3.0	
4M+			1-2-3 G

With the 16-megabyte DOS version of 1-2-3 3.0 (using Rational Systems' DOS/16M[4]), customers are getting almost the same thing as the OS/2 versions (although networking will be better with OS/2 when the network software arrives). The extended-DOS version lacks the ability of the OS/2 versions to operate simultaneously or in conjunction with other OS/2 applications -- a capability that isn't important now but that will become so when other OS/2 applications proliferate. Few applications by themselves need OS/2 that badly as yet, but they will need OS/2 to the extent that they need to work with each other. On the other hand, there are a large number of users perfectly content with DOS and the applications that run on it, and they will be served well by 1-2-3 2.2 (code-numbered 2.5) and other DOS applications that expand using the Rational Systems' minimal-disruption approach. (It requires a 286 or 386).

4The LIM Specification for expanded memory, supported by Lotus itself among others, doesn't do the job elegantly. It's better for switching among chunks of memory that will then stay put (and requires extra time and instructions to do so) than for providing fast real-memory access to random code and data. In essence, LIM treats the extra memory as something you can take data from piece by piece through a small keyhole, while DOS/16M lets the application address the extra memory directly.

There's no fundamental difference among the three editions of each release, except for some counter and access control software in the server edition. The server edition includes a copy of the node (user) software and a single license to use it, along with a counter mechanism for subsequent users. The node edition is a license to use the node software included with the server version, and comes in a package that contains documentation but no disks. And the standalone edition includes single-user software and documentation.

Thus, 1-2-3's server editions are not true server software but a pricing/distribution mechanism that will lower the price and raise the ease-of-installation of 1-2-3 for multi-unit buyers. Because a spreadsheet is more a data-manipulation and analysis tool than a proper data storage system, it's appropriate that it should exist only in front-end, client form. The appropriate back-end is not a "server" spreadsheet, but a database -- which 1-2-3 implicitly has through data access tools such as Blueprint and The Application Connection.

CASE STUDY: COMPUTERLAND

We first met **Ed Anderson** when he was doing "business development" at American Express, starting the unit that now sells some $50 million of Tandy product annually to AmEx card-holders. "In the focus groups we did, one thing was amazingly clear. Those small-business owners -- not the corporate people but the ones who were running their businesses off their card -- they believed in technology but they didn't trust the people who were selling it to them. Yet they believed in us, in American Express. They could see how we were using it -- 24-hour turnaround on a new card, personal letters, that kind of thing -- and so they trusted us."

That's the background that Anderson now brings as chief operating officer of **ComputerLand** (since last May) via four years at Computer Factory, where "instead of 50-page reports and studies we operated with two-and-a-half-minute discussions." At ComputerLand he faces internal problems rather than what is probably the country's toughest retail market.

Aside from simply raising the level of trust, he says, the first task is to get the company's royalty rate down to where franchisees can be profitable -- from 8 percent at the peak to about 5 percent now and 3.5 percent on average ideally. "There's nothing theoretically wrong with franchising," Anderson asserts. "McDonald's has proved you can get profits and consistent high quality through franchising. But we had a culture from the Millard era where corporate was living high on the hog off the backs of the franchisees. We've doubled our U.S. growth rate with 150 fewer people since I arrived [now at 500]."

Other things include consolidation of advertising, so that franchisees can rely on corporate for a common look and feel rather than do their own ad production at $60,000 to $300,000 per year. "With 40 groups doing that, it adds up," says Anderson, "and the result is confusion for the customer." Another is helping the franchisees to automate their own operations, so that "people don't spend half their time chasing down inventory. With a multi-vendor environment, it's a fire drill out there."

But Anderson is dubious, for the moment, about electronic distribution of software, despite installations of the On Demand system at several Computer-

Land franchisees. "I joke that we have the bottom 150 packages," he says. "Not one of the top 10 vendors has signed up for it yet." He thinks the technology will work long-term, and notes that it might make sense for Microsoft or a UNIX vendor as a way to induce resellers to stock pricy new OS/2 or UNIX applications without having to pay upfront.

THE PEOPLE

Gordon Bell: A man of many generations

Gordon Bell has more start-ups to his credit than anyone we know. After graduating at MIT in 1957 and avoiding business for a couple of years more on a Fulbright in Australia and some more time at MIT, he started at DEC in 1960 and got badge number 80. Six years later he took a six-year sabbatical to help start up Carnegie-Mellon's computer science department, thus indirectly fostering the development of Mach, the UNIX variant that runs on the NeXT machine (among others). He returned to DEC in 1972 to develop the VAX, and left again in 1982 to found Encore (the French form of "next," in case you missed it). Encore has just announced the equivalent of a 3090 at one-fifteenth the price, but Bell left the company in 1986 to start the computer directorate at NSF while advising Ardent on the design of the Titan, a graphics supercomputer. He joined Ardent fulltime last year. (No, he's not bringing a Titan to Palm Springs, but his wife Gwen Bell, founder of the Boston Computer Museum, has brought an interesting tape from her archives.) "My motivations for building a company are that I can't get it done where I am," says Bell. He has watched hardware transitions many times: "We're begging and pleading with people to put their horrible old software on our machine, but what we really want is the new stuff that will make it sing." We invited Bell to speak because he knows enough about the past to have some perspective on the future.

John Seely Brown: A radical, cross-disciplinary guy

John Seely Brown runs advanced research at Xerox PARC and sits on the board of MicroPro -- an interesting vantage on the pc marketplace. He is also a member of the Computer Science Technology Board of the National Academy of Sciences. After a stint doing AI work at Bolt, Beranek & Newman he joined PARC in 1978 "in search of bigger address spaces to do ever more wild things with computers," he says. "By the 1990s the limits won't be on what computers can do but on what people can understand and handle. So we'll have to pay more attention to the people side -- how people learn and communicate, and then to how organizations learn and communicate. We have to move from hard technology to softer issues, from user interfaces to organizational and even cultural interfaces." It's tough to get Brown to explain precisely what he does at PARC because he's trying to create "a seamless environment free of hierarchical rigidities," but we gather it has to do with turning PARC into "a radical, cross-disciplinary place," hiring among others anthropologists, computational philosophers and metaphysicists. He himself held a joint appointment in computer science and cognitive sciences at Irvine in the Seventies. Most recently, he helped PARC create a new unit, the Institute for Research on Learning.

WHY WE DO THE THINGS WE DO, THE WAY WE DO

We make a lot of decisions in running this conference. Some of them are apparent; some may even be mystifying. Herewith a Q&A:

Why do you hold it in such an out-of-the-way place? We hold it away from the centers of our reader population to avoid the chat-&-run syndrome, where people (especially speakers) come in for just a short time and quickly depart, or spend all their time in town outside the Forum calling on local dignitaries. (Most of us don't yet have extensive social circles in Palm Springs.) That same reason, incidentally, is why there's no discount if you don't stay the full two-and-a-half days.

Why do you have so many panels? Because we want to hear people's unvarnished thoughts rather than their prepared presentations. Our general guideline to speakers: Say just enough to get them excited. Also, we like to share the floor among as many people as possible. We're having fewer speakers and panelists this year so that people in the audience will have more opportunity to inter-- ah, contribute.

How come you sold out so early? Guess we priced it too low! *How come Juan and Alice couldn't get in?* It's the usual story: At some point (we hope it's not below the 480 people attending) the whole event loses its intimacy, and we just can't let everyone in. One piece of advice: Sign up early next year, because it seems we'll have to be tougher than ever.

Why don't you have debates? Someone else has the copyright. We prefer to innovate with content, not form.

Why do you have general sessions in the morning, and concurrent sessions in the afternoon? History, and we can't think of any reason to change it. (Let us know if you have one.)

Why don't you have speaker ribbons? One year they didn't arrive on time, and we tried it without them. It worked fine and felt more democratic. (*All* our attendees are special.)

Why do you have the early-registration discount? We were trying to figure out how to give the little guys a break, but counting revenues gets hairy. What do you do with subsidiaries? WIth this-year vs. last year? In the end, we realized that it's not *small* companies that we like so much, but nimble, unbureaucratic ones. We figured that anyone who can cut a check (or any individual who cares enough to write his own) within a month qualifies. (Next year, watch out. We're also planning a late-registration surcharge, for as much as necessary to keep demand down.)

Why don't you allow more than one photographer? Because that would be disruptive. The photographer you see is our sister-in-law, and she does a great job. *What about the press?* We also don't encourage press, but we allow them to attend on the same basis as everyone else. Since we sell out, we're not eager to generate much additional publicity, and we can't really justify giving away seats other people want enough to pay for.

Why are so many of your staff pregnant? Please ask your parents...

1989 PERSONAL COMPUTING FORUM: GET SET FOR THE NINETIES

Daphne Kis, Forum director

Our roster of speakers is:

Tania Amochaev	Natural Language Incorporated
Ed Anderson	ComputerLand
Gordon Bell	Ardent
John Seely Brown	Xerox PARC
Jim Cannavino	IBM Entry Systems
Vittorio Cassoni	Olivetti
John Dvorak	Himself (ED^wards MC)
Bob Epstein	Sybase
Ed Esber	Ashton-Tate
Gordon Eubanks	Symantec
Bob Frankenberg	Hewlett-Packard
Bill Gates	Microsoft
Adele Goldberg	ParcPlace Systems
Bill Joy	Sun Microsystems
Philippe Kahn	Borland International
Mitchell Kapor	ON Technology
Bob Kavner	AT&T
Frank King	Lotus
Chip Lacy	Ingram Micro D
John Roach	Tandy
Mort Rosenthal	Corporate Software
John Sculley	Apple
Enzo Torresi	NetFrame
David Tory	Open Software Foundation
John Warnock	Adobe

We are also arranging company/product/concept presentations by certain attendees. They include Action Technologies, Adobe, AICorp, Aion, Aldus, Avalanche, Brightbill-Roberts, Channel, Claris, Clear Software, Coordination Technology, DB/Access, Folio, Fox, Geovision, Hewlett-Packard (NewWave), IBM (MicroChannel architecture), Interbase, Lotus (Magellan/Notes/new 1-2-3), MacroMind, MapInfo, Microrim, NetFrame, New Shoes, NeXT, Novell, Persoft, Phoenix, Premise, Saber Software, SoftQuad, Softsel (UNIX division), Software Publishing, Stepstone (NextStep/Objective-C), Sun Microsystems, Sybase, Tandy (DeskMate/Open Desktop), Traveling Software (ViewLink), Verity, Wang (Freestyle), WordTech.

Desert EDventure! Stanford PhD in geophysics Colleen Barton (Larry Tesler's wife) will lead a day-long field trip exploring natural sites and a geodetic station (where they measure fault activity) on Tuesday for companions, "children" over 12 (with a parent) and miscreant attendees. (Palm Springs sits near the San Andreas fault.)

THE EDwards

presented by John Dvorak

The VaporWare EDward (awarded by Stewart Alsop):
Contenders: [received too late to be listed]

The best-name EDward:
Contenders: Adobe for Streamline; Channel Computing for Forest & Trees; Funk Software for AllWays; Apple Computer for WildCard (withdrawn); Network General for The Sniffer; Aldus for Persuasion.

The Forestry EDward for paper consumption:
Contenders: Apple; 3Com; IBM; Novell; Microsoft; Sun Microsystems.

The Ester Dysan of Adventure Moldings EDward:
Contenders: Dan Flystra of VisiCorp and Frontline Systems; Dan Brickland; Steve Jobes of NeXT; Vadim Who? of Clear Software; Enzo Toressi; Safi Quereshey of AST Research; Cunningham Communications; Vinod Koshla; Avery Moore of CompuCom (and anyone whose name we misspell -- oops!).

The Go-Back-to-CleveLand EDward:
Contenders: IntelliCorp; Interbase/InterBase; NeXT; dBASE/Dbase; Powerbase/Power Base; ComputerLand; EDventure Holdings/RELease 1.0 (withdrawn).

The That's-My-Best-Friend! EDward:
Contenders: Phil Estridge (the original); Art Einstein of Lord Einstein; Joe Canion of Compaq; Linwood Lacy; Louis J. Doerr; James Manzi; Samuel J. Kaplan of GO Corp.; Willard E. Peterson of Word Perfect; Katharine Branscomb of IntelliCorp; Catharine Carhart of Orion.

The Mike Tyson Pugilistic Enthusiasm EDward:
Contenders: Ed Esber of Ashton-Tate; Philippe Kahn; Larry Ellison; Dave Norman; Michael Shane; Bill Joy; Open Software Foundation.

The Mike Markkula/Gordon Bell EDward for judicious mobility:
Contenders: Vern Raburn; Spencer Leyton; Ron Posner; David Blumstein; Graham Beachum.

The EDward for sartorial splendor:
Contenders: Dan Bricklin; Mitchell Kapor; Ben Rosen.

The EDward for physical splendor:
Contenders: [censored]

The EDward for IBM alumni:
Contenders: Frank King; Graham Beachum; Gideon Gartner; Don Casey; Morris Taradalsky; Art Goldberg; Glenn Henry; Mike Maples; Andy Heller; Sam Albert.

The ED^ward for Apple/Sun footsoldiers:
Contenders: Wayne Rosing; Joe Roebuck; Jim Bean; Jim Davis; Chuck Berger; Chuck Berger (MIPS).

The ED^ward for achievement by a white male:
Contenders: Vadim Yasinovsky; Arthur Einstein; Fred Gibbons; Peter Norton; Dan Bricklin.

The ED^ward for best ROI on a consulting contract:
Contenders: Jim Manzi; Rich Shapero; Ron Posner; K.C. Branscomb; John Merson; Gordon Bell; Jon Lazarus; Ed Esber.

The Pax Machina ED^ward for cross-cultural understanding:
Contenders: Bill Lohse; Marty Mazner; John Sculley; Victor Alhadeff; Tandy for its acquisition of GRiD; Microsoft for its investment in SCO.

Further nominations for contenders and for additional ED^wards will be gladly considered on site. You do not need to be present to be nominated, but you must be present to win. No hiding -- and no anonymous nominations!

Thanks to Pyramid Technology for the ED^wards movie!

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COMING SOON...

- *Visual programming languages: Modeling and simulation.*
- *A composition engine.*
- *Active and passive objects.*
- *And much more... (If you know of any good examples of the categories listed above, please let us know.)*

Also, we will be traveling to the Soviet Union in April. Please let us know of any contacts over there whom we should visit.

RELEASE 1.0 CALENDAR

March 21 — **Effective marketing for a small computer and software services company** - Santa Clara. Sponsored by Adapso. Speakers from Landmark, Lawson Associates and Tower Systems (if you haven't heard of them, now you know this is really for small companies!) Call Phyllis Cockerham, (703) 522-5055.

March 22-23 — **Neural networks in the real world** - San Jose. Keynote by DARPA program manager Barbara Yoon. Organized by Tom Schwartz; managed by International Planning Information. Contact: Murray Disman, (415) 364-9040.

March 22-23 — **International Phoenix conference on computers and communications** - Phoenix. Keynote by TRW's Barry Boehm. Sponsored by IEEE et al. Call Kathleen Mutch, (602) 891-6080.

March 23 — **Software Patents: A Horrible Mistake?** - Cambridge, MA. With Dan Bricklin, Lindsey Kiang (DEC/ex-Lotus), Duff Thompson (WordPerfect), others. If you can't make Palm Springs, stay east for this. Sponsored by MIT communications Forum. Call Rena Themistocles, (617) 253-3144.

March 28 — ***Object-oriented database seminar** - Boston. Sponsored by Object Design. Call Gene Bonte, (617) 270-9797.

March 28-30 — **Fourth CD ROM conference** - Anaheim. Sponsored by Microsoft. Contact: Sherrie Eastman, (206) 867-3305.

March 28-30 — **AAAI's Spring Symposium on innovative applications of AI** - Stanford, CA. AI in many guises: manufacturing, language, software engineering, knowledge systems, planning, search. Sponsored by AAAI. Call Rick Skalsky, (415) 328-3123.

March 29-31 — **Visions '89** - San Diego, CA. Sponsored by ABCD, the microcomputer industry association (mostly dealers). With HP's John Young. Contact: Deborah Keating, (312) 240-1818.

March 30-31 — **Computing with adaptive neural networks** - San Francisco Airport. Sponsored by AI Expert Magazine, with editor Phil Chapnick and Ed Rosenfeld, Mark Gluck and Misha Pavel. Contact: Bill Rutledge or Anastasi Mills, (415) 995-2471.

April 3-5 — ***Patricia Seybold's third annual Technology Forum** - Cambridge, MA. Sponsored by Patricia Seybold's Office Computing Group. With a focus on object-oriented computing. Contact: Connie Sagona, (617) 742-1028.

April 10-13 — ***Spring Comdex** - Chicago. Keynote panel: John Doerr, Kleiner Perkins; Ray Noorda, Novell; Heidi Roizen, T/Maker. Also including MACdex, with a keynote by Claris' Bill Campbell. Contact: Jane Wemyss at (617) 449-6600.

April 10-13 — **Electronic Imaging West** - Pasadena. Sponsored by the Institute for Graphic Communications. Call Richard Murray, (617) 891-1550.

April 12-14 — **International markup conference** - Gmunden, Austria. Sponsored by Graphic Communications Association. Contact: Marion Elledge at (703) 841-8160.

April 12-14 — **Facsimile and image communications conference** - Orlando, FL. Sponsored by CAP International. Call Kristin Fischer at (617) 982-9500.

April 17-19 — **Macintosh business conference & exposition** - New York City. Sponsored by Cambridge Marketing. Keynote by John Sculley; also MacUser's Marty Mazner and Fred Davis. Contact: Brice Hereford, (800) 262-3378 or (617) 860-7100.

April 17-19 — **NCGA '89** - Philadelphia. Sponsored by National Computer Graphics Association. Contact: Michael Weiner at (800) 225-6242 or (703) 698-9600.

April 18-20 — **Connect '89** - Boston. Sponsored by Cahners Exposition Group with Larry DeBoever and Dale Kutnick. For MIS managers mostly. Contact: Dave Sell at (203) 964-0000.

April 20-21 — **COMPUTER ACCESS AND USE FOR DISABLED PERSONS** - Newington, CT. See March 9. Call Greg Vanderheiden, (608) 262-6966.

April 26-28 — **Executive UniForum Symposium** - Santa Barbara, CA. For MIS executives. Sponsored jointly by Patty Seybold's Office Computing Group and /usr/group. Contact Judy Hurwitz, (617) 742-5200, or Ed Palmer, (408) 986-8840.

April 30-May 4 — **CHI '89: Conference on human factors in computing systems** - Austin. Sponsored by ACM/SIGCHI and a host of other groups. Contact: Claudia Raun, MCC, (512) 338-3798.

May 2-3 — ***High-Tech 1992** - London. Selling high tech in a unified Europe. Sponsored KPMG, (Peat Marwick). With Regis McKenna, Apple's Mike Spindler, others. Contact: Sara Hooper, (011) 44 1 236-8000, fax 248-6552.

May 4 — **Financial applications of expert systems** - Los Angeles. Sponsored by Arthur Young, c/o Barbara Day, (213) 977-3284.

May 7-10 — **ASM Information Systems conference** - Dallas. Keynote speeches by Dave Eskra of Pansophic and Bob Berland of IBM. Sponsored by the Association for Systems Management. Contact: Terri Gibbons, (216) 243-6900.

May 7-10 — ***IBM computer services and consultants executive conference** - Phoenix. Contact Norm Urquhart, (914) 749-3154.

May 8-12 — **CASExpo** - Washington, DC. With John Henderson of MIT, Pieter Mimno of James Martin Associates, others. A fine place to meet vendors and see demos. Sponsored by Arthur Young. Call Dick Welsh, (214) 969-8000.

May 9-11 — **OpticalStorage89** - San Jose. Back for the fourth time by popular demand. Sponsored by DISK/TREND and Freeman Associates. Call Darlene Plamondon, (408) 554-6644.

May 9-11 — **Second international conference on computer-assisted learning** - Dallas. Sponsored by U of Texas' Computer Learning Research Center. Contact: Janet Harris, (214) 690-2204.

May 11 — **Massachusetts Software Council spring membership meeting** - Newton, MA. Contact: Joyce Plotkin at (617) 437-0600.

May 11-12 — **Tenth annual Computer Law Institute** - Los Angeles. Sponsored by U of Southern California. Contact: Karen Sprague at (213) 743-2008.

May 14-17 — ***ADAPSO Management Conference/IIA Spring Conference** - San Diego. Mingle with your peers (and the zoo's nearby just in case). A joint session sponsored by ADAPSO and the Information Industry Association, with the usual round of business-focused sessions, networking and speeches by luminaries, including AT&T's Robert Allen and Sun's Scott McNealy. Contact: Sheila Wakefield, (703) 522-5055.

May 15-18 — **Eleventh international conference on software engineering** - Pittsburgh. Sponsored by IEEE et al. Contact: Larry Druffel, (412) 268-7740.

May 16-18 — **CEPS '89** - Chicago. Corporate electronic publishing systems. Sponsored by Cahners Exposition Group. With Joe Guglielmi, IBM; Yuri Rubinsky, SoftQuad; Raymond Kammer, NIST; Dan Cheifetz, Odesta; Jim McNaul & Art Coles, Xerox; others. Contact: Kim Ray, (203) 964-0000.

May 19-20 — ***Indexing in the 90s** - San Francisco. Sponsored by the American Society of Indexers. Speakers from KnowledgeSet, Hewlett-Packard, McGraw-Hill, MaxThink, others. Contact: Nancy Mulvany, (415) 524-4195.

May 21 — **Warning! Annual Bay to Breakers Race** - San Francisco. Sponsored by the San Francisco Examiner.

May 21-24 — ***Software Publishers Association spring symposium** - San Diego. Sponsored by SPA. Speakers include Ed Esber, Bill Gates, Steve Jobs, Jim Manzi; also the Excellence in Software Awards with Harry Anderson. Contact: Jayne White, (202) 452-1600.

May 21-24 — **Expert systems and the leading edge in productions and operations management** - Hilton Head Island, SC. Sponsored by AAAI, the Operations Management Association, others. Contact: Libby Shropshier, (803) 777-2231.

May 23-25 — **Information engineering forum** - Washington, DC. Sponsored by James Martin Associates. Contact: Denise Dellinger, (703) 620-9504.

May 31-June 1 — **Portable Computing '89** - Santa Clara. Sponsored by Portable Computer Review, Traveling Software, Hajar Associates. Keynote by Chris Demos of Federal Express. Call Kathleen Duris at IDG Conference Management, (508) 879-6700.

May 31-June 2 — ***SIGMOD** - Portland, OR. User interfaces to dbms systems and some more esoteric management of data topics. Sponsored by ACM/SIGMOD. Keynote: Esther Dyson! Contact John Bruno, (503) 629-8383.

June 5 — **Toshiba Micro Industry Golf & Tennis Celebrity Tournament** - Industry Hills/Los Angeles. With Tom Selleck, others; funds raised go to the Starlight Foundation for terminally ill children. Contact: Dave Freeman, (714) 558-8813.

June 5-8 — ***AIIM show & conference** - San Francisco. "Discover the power of imaging." Keynote: astronaut Wally Schirra. Sponsored by the Association for Information and Image Management. Contact: James Breuer, (301) 587-8202.

June 6-8 — **International expert systems conference and exhibition** - London. Sponsored by Learned Information. Contact: Jean Mulligan, (011) 44 865 730275; fax, 865 736354.

June 11-14 — ***Expert Communication '89** - San Francisco. Sponsored by Graphic Communications Association and chaired by Mills Davis. Contact: Norman Scharpf, (703) 841-8160.

June 12-14 — **Seminars and conference on object-oriented programming** - Tyngsboro, MA. Sponsored by Wang Institute of Boston University and the Journal of object-oriented Programming. Eclectic and intensive, with sessions on C++, Objective-C, Eiffel and Smalltalk, among others. Contact: Lisa Gennell, (508) 649-9731.

June 12-16 — **Summer USENIX technical conference** - Baltimore. Tutorials on networking, environments, development tools, window systems, etc. Contact USENIX at (213) 592-1381 or 592-3243, or John Donnelly, (303) 499-2600 (exhibits) or Neil Ground Water (703) 883-1221 (papers).

June 13 — **Effective marketing for a small computer and software services company** - Chicago. Sponsored by Adapso. See March 19. Contact: Kelly Bailey, (703) 522-5055.

June 20-22 — ***PC Expo & National CASEcon** - New York. Sponsored by PC Expo. Call Steven Faher, (800) 444-EXPO or (201) 569-8542.

June 21-23 — ***Programming language design and implementation** - Portland, OR. Sponsored by ACM SIGPLAN. Contact: Bruce Knobe, (508) 879-2960 x3376 or Knobe@S56.Prime.com.

**The asterisks indicate events we plan to attend, not merit. Please let Denise DuBois know about any other events we should include.*

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Daphne Kis
Associate Publisher